Assignment 1: Basic Python Tutorial

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Task to Perform

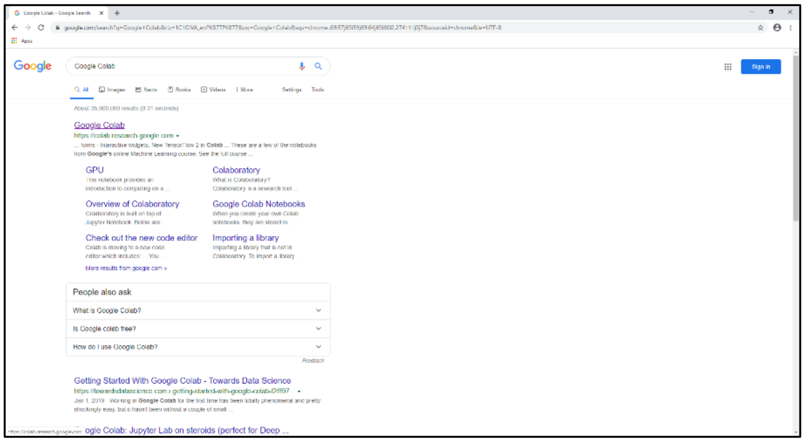
- **A Jupyter notebook named "python.ipynb" is shared in the assignment folder.**
- **You have to upload that notebook in google colab and then write the code for the tasks asked in comments.**
- **Examples are given below.**

Part 1: Introduction to Google Colab

- Google colaboratory is a free Jupyter notebook environment.
- That requires no setup and runs entirely in the cloud.
- With colaboratory you can write and execute code, save and share your analyses, and access powerful computing resources, all for free from your browser.
- Google colaboratory is accessed through your **Gmail credentials.**

Steps to start Google Colab

i. Go to your browser and type "Google Colab"



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Google Colab
https://colab.research.google.com ▾
... forms - Interactive widgets, New TensorFlow 2 in **Colab** ... These are a few of the notebooks from **Google's** online Machine Learning course. See the full course ...

GPU
This notebook provides an introduction to computing on a ...

Colaboratory
What is Colaboratory? Colaboratory is a research tool ...

Overview of Colaboratory
Colaboratory is built on top of Jupyter Notebook. Below are ...

Google Colab Notebooks
When you create your own Colab notebooks, they are stored in ...

Check out the new code editor
Colab is moving to a new code editor which includes: ... You ...

Importing a library
Importing a library that is not in Colaboratory. To import a library ...

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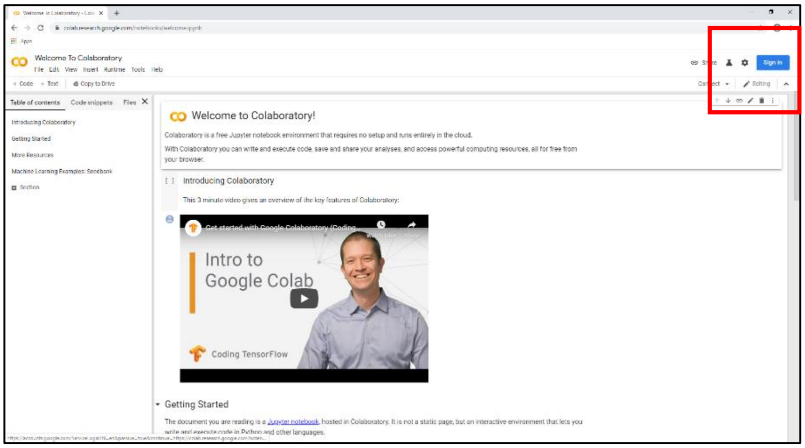
ii. Sign into "Google Colab" using Your Gmail id and Password.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Introducing Colaboratory
Getting Started
More Resources
Machine Learning Examples: Seedbank
Section
Get started with Google Colaboratory (Coding...
Intro to Google Colab
Coding TensorFlow

Welcome to Colaboratory!

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With Colaboratory you can write and execute code, save and share your analyses, and access powerful computing resources, all for free from your browser.

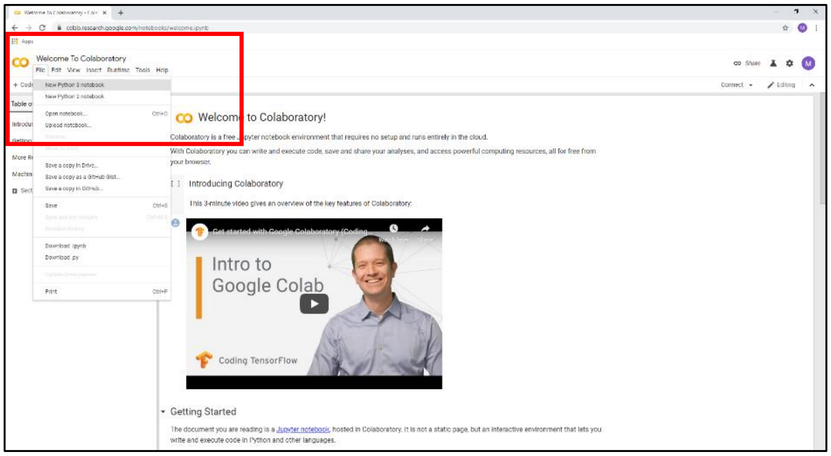
Introducing Colaboratory

This 3 minute video gives an overview of the key features of Colaboratory:

Getting Started

The document you are reading is a Jupyter notebook, hosted in Colaboratory. It is not a static page, but an interactive environment that lets you write and execute code in Python and other languages.

iii. Go to files and click on "New Python 3 Notebook"



Welcome to Colaboratory!

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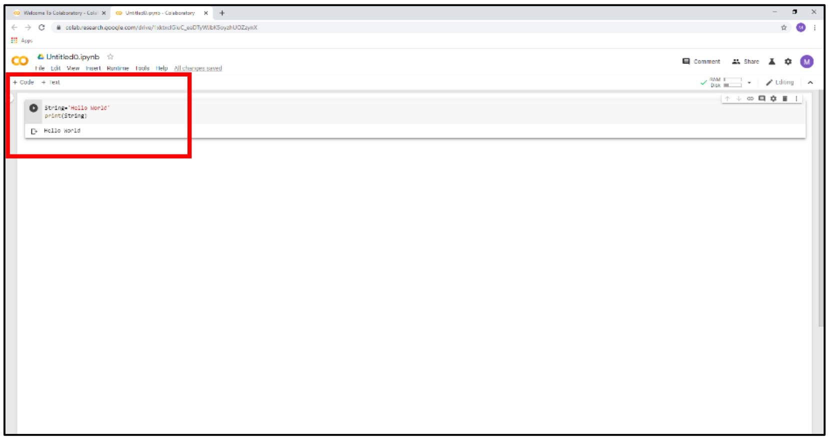
iv. Python 3 Notebook is ready to use Enter a string 'Hello World' and print using "print (string)".

v. Then click on play button at the start of the cell.



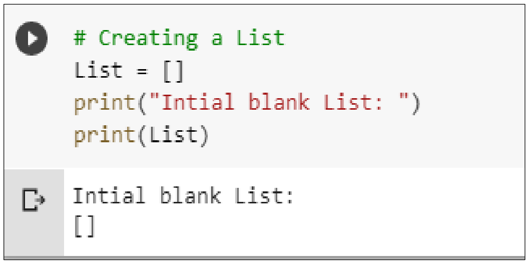
```
String='Hello World'
print(String)
```

```
Hello World
```

Part 2: Basic Python Tutorial

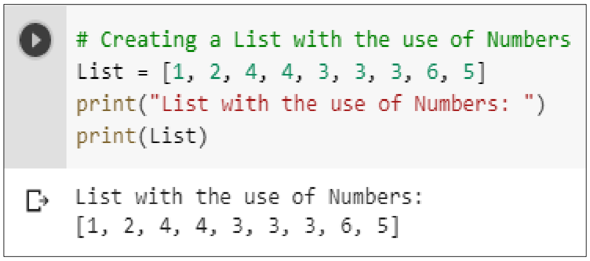
Python List

List Creation



```
# Creating a List
List = []
print("Intial blank List: ")
print(List)
```

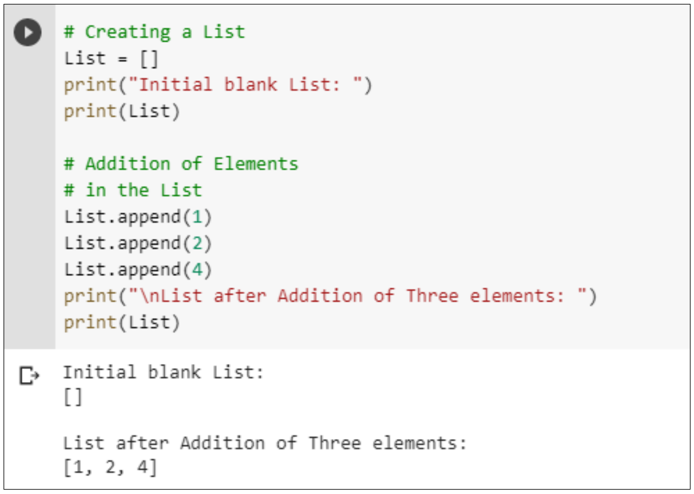
```
Intial blank List:
[]
```



```
# Creating a List with the use of Numbers
List = [1, 2, 4, 4, 3, 3, 3, 6, 5]
print("List with the use of Numbers: ")
print(List)
```

```
List with the use of Numbers:
[1, 2, 4, 4, 3, 3, 3, 6, 5]
```

Adding Elements to Lists



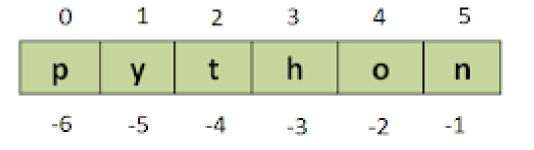
```
# Creating a List
List = []
print("Initial blank List: ")
print(List)

# Addition of Elements
# in the List
List.append(1)
List.append(2)
List.append(4)
print("\nList after Addition of Three elements: ")
print(List)
```

```
Initial blank List:
[]

List after Addition of Three elements:
[1, 2, 4]
```

Note: append() method only works for addition of elements at the end of the List, for addition of element at the desired position, `insert()` method is used. Unlike append() which takes only one argument, insert() method requires two arguments(position, value).

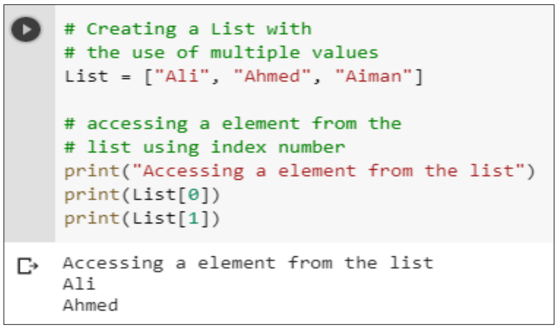
Accessing Elements from lists

- Postive Indexing
- Negative Indexing



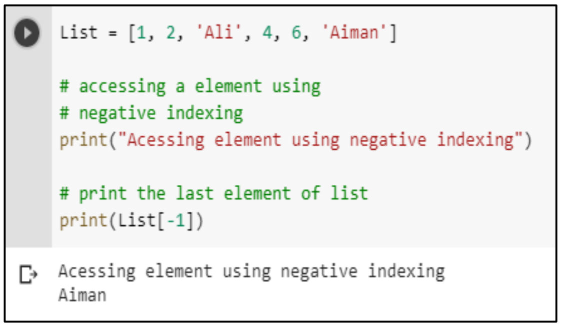
0	1	2	3	4	5
p	y	t	h	o	n
-6	-5	-4	-3	-2	-1

Fig. Positive and Negative Indexing for s='python'



```
# Creating a List with
# the use of multiple values
List = ["Ali", "Ahmed", "Aiman"]

# accessing a element from the
# list using index number
print("Accessing a element from the list")
print(List[0])
print(List[1])
```

```
Accessing a element from the list
Ali
Ahmed
```

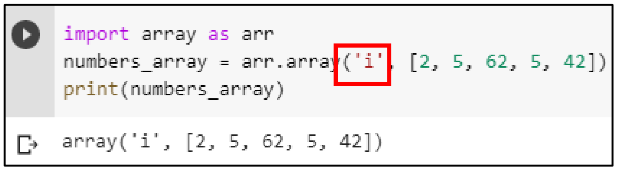


```
List = [1, 2, 'Ali', 4, 6, 'Aiman']

# accessing a element using
# negative indexing
print("Acessing element using negative indexing")

# print the last element of list
print(List[-1])
```

```
Acessing element using negative indexing
Aiman
```

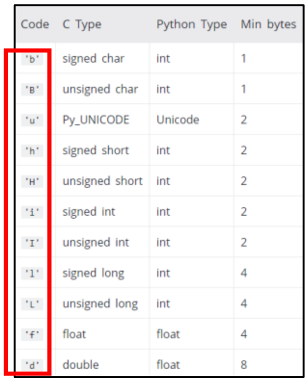
Python Array

Array Creation



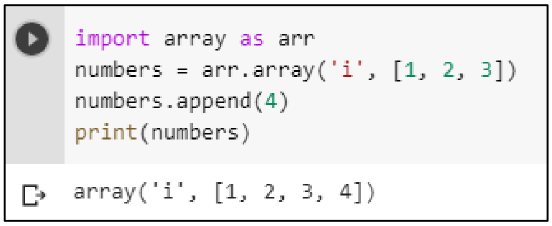
```python
import array as arr
numbers_array = arr.array('i', [2, 5, 62, 5, 42])
print(numbers_array)
```

```
array('i', [2, 5, 62, 5, 42])
```



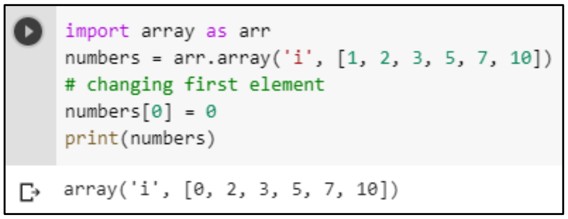
Code	C Type	Python Type	Min bytes
'b'	signed char	int	1
'B'	unsigned char	int	1
'u'	Py_UNICODE	Unicode	2
'h'	signed short	int	2
'H'	unsigned short	int	2
'i'	signed int	int	2
'I'	unsigned int	int	2
'l'	signed long	int	4
'L'	unsigned long	int	4
'f'	float	float	4
'd'	double	float	8

Adding or Changing Elements to Arrays



```python
import array as arr
numbers = arr.array('i', [1, 2, 3])
numbers.append(4)
print(numbers)
```

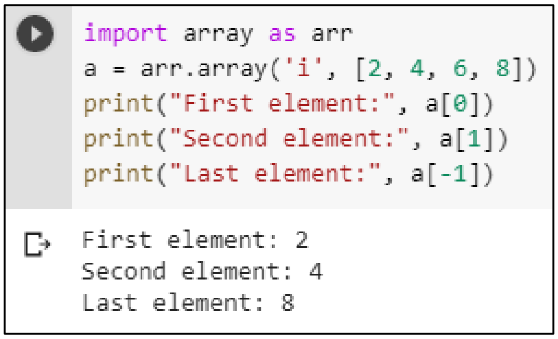
```
array('i', [1, 2, 3, 4])
```



```python
import array as arr
numbers = arr.array('i', [1, 2, 3, 5, 7, 10])
# changing first element
numbers[0] = 0
print(numbers)
```

```
array('i', [0, 2, 3, 5, 7, 10])
```

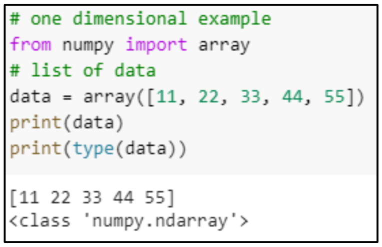
Accessing Elements from Arrays



```python
import array as arr
a = arr.array('i', [2, 4, 6, 8])
print("First element:", a[0])
print("Second element:", a[1])
print("Last element:", a[-1])
```

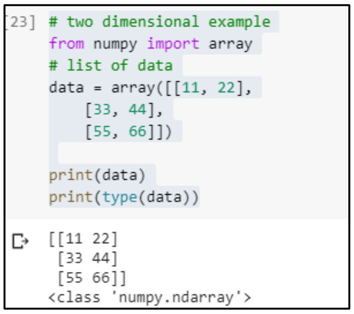
```
First element: 2
Second element: 4
Last element: 8
```

1D, 2D, 3D Arrays and accessing their elements



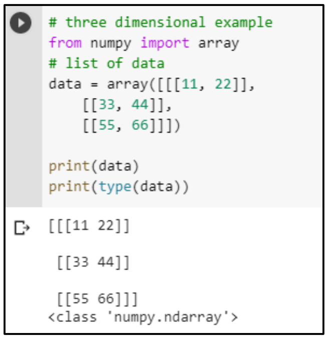
```python
# one dimensional example
from numpy import array
# list of data
data = array([11, 22, 33, 44, 55])
print(data)
print(type(data))
```

```
[11 22 33 44 55]
<class 'numpy.ndarray'>
```



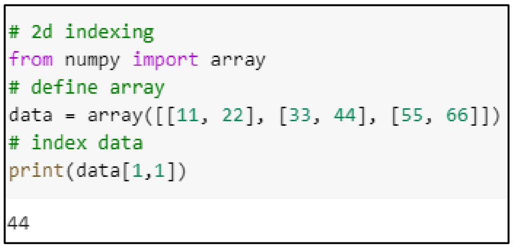
```python
# two dimensional example
from numpy import array
# list of data
data = array([[11, 22],
    [33, 44],
    [55, 66]])

print(data)
print(type(data))
```

```
[[11 22]
 [33 44]
 [55 66]]
<class 'numpy.ndarray'>
```



```python
# three dimensional example
from numpy import array
# list of data
data = array([[[11, 22]],
    [[33, 44]],
    [[55, 66]]])

print(data)
print(type(data))
```

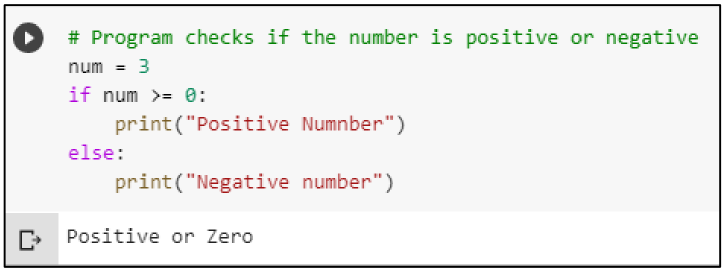
```
[[[11 22]]

 [[33 44]]

 [[55 66]]]
<class 'numpy.ndarray'>
```



```
# 2d indexing
from numpy import array
# define array
data = array([[11, 22], [33, 44], [55, 66]])
# index data
print(data[1,1])
```

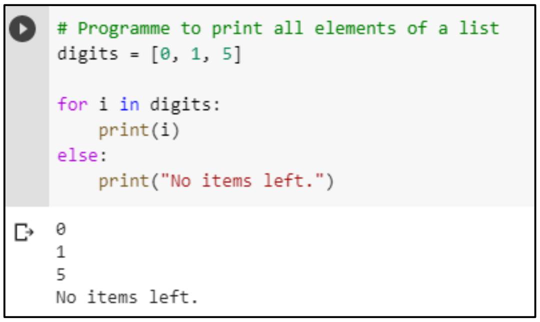
```
44
```

Python for, if and else: Statements



```
# Program checks if the number is positive or negative
num = 3
if num >= 0:
    print("Positive Numnber")
else:
    print("Negative number")
```

```
Positive or Zero
```

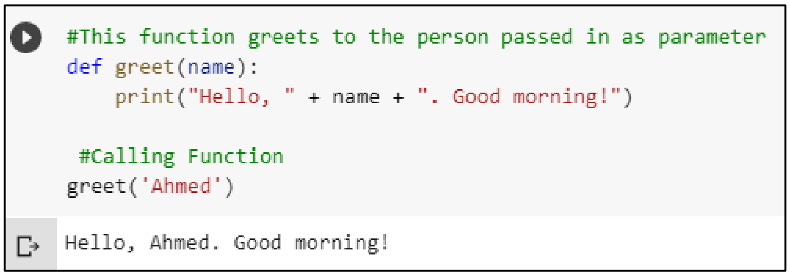


```
# Programme to print all elements of a list
digits = [0, 1, 5]

for i in digits:
    print(i)
else:
    print("No items left.")
```

```
0
1
5
No items left.
```

Functions in Python

Create and call a function



```
#This function greets to the person passed in as parameter
def greet(name):
    print("Hello, " + name + ". Good morning!")

 #Calling Function
greet('Ahmed')
```

```
Hello, Ahmed. Good morning!
```